Spotlight: Turning Precision Medicine into Precision Prevention

More than half of Americans don’t get enough sleep. The Centers for Disease Control and Prevention (CDC) have dubbed our lack of sleep a public health epidemic, contributing to chronic conditions like hypertension, diabetes, cancer and obesity. It can also affect how well treatments and prevention work.

Aric Prather, PhD, is an assistant professor of psychiatry at UCSF who studies how sleep or lack of it affects the immune system. In a recent study [1], Prather and his colleagues enlisted 164 volunteers and recorded information on their normal sleep patterns. Then they exposed the volunteers to a cold virus. The result: people who got less than six hours of sleep a night were more than 4 times more likely to get sick than those who got a decent night of 7 hours or more.

In an earlier study [2], Prather found that a shortage of sleep also can interfere with the effectiveness of vaccines. Following a group of healthy, middle-aged volunteers over the six-month course of vaccination for hepatitis B, Prather again found that sleeping less than six hours a night was problematic. Volunteers in this group turned out to be 11 times less likely to meet CDC guidelines for clinical protection.

“What this means is that chronic behavioral problems like sleep deprivation can lead to chronic health problems,” Prather says, adding that social factors such as income, education and exposure to pollution have important affects, as well. That’s why this kind of data, which historically has been ignored in medical care, should be included in a precision medicine approach.

The role of social and behavioral sciences in precision medicine is to look at the environment side of the gene-environment interaction. We need to look at the full spectrum of health determinants: people’s individual experiences, family systems, the community and environmental factors, Prather says. We know that all those things are likely to be related to health and they are also likely to interact with a lot of things we’re collecting data on at the biological level. Now, we need to begin integrating those measures.

Once physicians have a better understanding of how behavioral and social factors increase the risk for disease, Prather explains, they can combine that information with genomic and other types of data about a patient or population. This meshing of data is exactly what precision medicine’s knowledge network [3] will be designed to do, with efforts already underway to gather a wealth of such information to include in the knowledge network effort.

To make social and behavioral data accessible to all health care providers, though, it needs to become a routine element of patients’ medical records, alongside numbers like blood pressure and body weight. That will enable behavioral researchers to find the patterns that might lead to or predict disease.

“Social and behavioral factors play an important role,” Prather says. “They have predictive
value, identifying risk. In other words, these factors go beyond contributing to better treatments: they also promote more effective prevention early on, keeping people healthier in the first place.

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